ISSN 1025-0247
Available: http://www.agrisost.reduc.edu.cu
Novum cubanus plantae coluerunt I

Recent Introduction of *Plumeria pudica* of the *Apocynaceae* Species in Cuba

Julio C. Rifa Tellez[1] & Isidro E. Méndez Santos[2]

Received: June 30, 2017

Accepted: August 28, 2017

ABSTRACT

To reveal the identity of an allochthonous species recently introduced in Cuba and grown as ornamental plants, several botanical procedures (collections, catalogues and keys, description, and scientific illustrations) were performed. The presence of *Plumeria pudica* Jacq in Cuba was confirmed, and a dichotomous key was presented to contrast species of this genus now present on the island.

KEY WORDS/: *Plumeria pudica*, *Plumeria*, *Apocynaceae*, ornamental plants

.

INTRODUCTION

Genus *Plumeria* L. (*Apocynaceae*, *Rauvolfioideae*) includes 7-8 species, distributed in Mexico, Nicaragua, The Antilles, Guyana, Venezuela, Colombia, and Peru (Morales, 2006), some of them are cultivated in several other parts of the world (Chong, Tan & Corlett, 2009). The estimates about the number of species in the Cuban flora have varied depending on taxonomic and nomenclature criteria, with a maximum of 12 (Lippold, 1979), and a minimum of 3 (Greuter & Rankin, 2016); these reports were assumed for the present study. In recent years, another not previously observed species for over 30 years of work in Cuban fields and gardens has widespread.

At the herbarium of the University of Camaguey (HIPC) several requests from garden professionals and ornamental plant collectors were made to help with identification of the species. It was a complex task, since that particular genus was not registered in the most relevant catalogues of the national flora (Pichardo, 1862; Sauvalle, 1873; Gómez de la Maza, 1889 and 1897; Gómez de la Maza & Roig, 1914; Calvino, 1923; Agete, 1939; Alain, 1957; Anonymous, 1958; Roig, 1965; Alain, 1969; Boldo & Estévez, 1990; Esquivel, Knüpffer & Hammer, 1992 and Greuter & Rankin, 2016).

Accordingly, the aim of the study was to identify, name, describe, and illustrate the plant.

[1] B.S in Education, Specialist in Biology, M. Sc Associate Professor, Center for Environmental Management Studies Ignacio Agramonte Loynaz University of Camaguey: julio.rifa@reduc.edu.cu https://orcid.org/0000-0002-4187-1342
[2] PhD, Full Professor, Center for Environmental Management Studies Ignacio Agramonte Loynaz University of Camaguey: isidro.mendez@reduc.edu.cu https://orcid.org/0000-0002-4187-1342

ISSN 1025-0247

Available: http://www.agrisost.reduc.edu.cu

MATERIALS AND METHODS

A collection of samples and pictures of the species was made in some Camaguey city gardens. The specimens were deposited at the herbarium of the Ignacio Agramonte Loynaz University of Camaguey (HIPC, according to permanently updated Thiers). Their identities were determined at the beginning, based on comaprisons with descriptions and keys found in Zarucchi, (1987 [1988]), Woodson, Schery & Nowicke (1970), Allorge (w.s.). The preliminary results were contrasted with images available on the Internet (http://www.tropicos.org/Image, 100118595 to 98), and digital sources in the herbarium: GH, K and NY (The New York Botanical Garden, w.s.), whose access was made possible by JSTOR (http://plants.jstor.org). The description assumed the Font Quer (1975) terminology.

The search for documentary evidence of the existence of the species in Cuba included a review of materials already deposited in herbaria elsewhere: HAC, HAJB, HIPC and ULV (permanently update Thiers), as well as literature review.

RESULTS AND DISCUSSION

The species was identified as Plumeria pudica Jacq. The nomenclature, description, distribution, ethnobotany, and behavior data for Cuba are,

Plumeria pudica Jacq., Sel. Strip. Amer. Hist.: 37. 1763. Type: Jacquin s.n. [n.v.].

=*Plumeria caracasana* J. R. Johnson, Contrib. U. S. Nat. Herb. 12: 108. 1908. Holotype: [specimen] Venezuela, La Guaira, Robinson & Lyon s.n., 13-VII-1900 (US [photo!]).

=*Plumeria cochleata Blake*, Contrib. Gray Herb., n.s. 53: 47. 1918. Holotype: [espécimen] Venezuela, between Coro and Alta Gracia, 1-V-1917, H.M. Curran & M. Haman 742 (NY [photo!]).

Common names: (Bridal Bouquet) *florón, lechoso, verano, amapola* (Colombia), according to Rodríguez, Banda, Reyes & Estupiñán, 2012; *doncella, doncella olorosa* (Curazao), *jazmín de copa, lirio, velo de novia* (Cuba).

It is a shrub or tree, 3-4 m high, with young round stems, slightly angular, with prominent foliar scars. Alternate leaves; 0.5-1 cm long glabrous to pubescent petioles; obovate, oblong-obovate to lyrate sheets, 12-30 × 5-14 cm, membranaceous or rarely sub-coriaceous; pubescent leaf surface; rarely pillous glabrous reverse; attenuated or acutely cuneate base; acuminate apex; entire frequently pandurate margin (especially at a young age). Thyrsoid inflorescence, 20-25 flowers, generally lax; glabrous axes; 7-14 cm long peduncles; 8-12 mm pedicels. Appealing hermaphrodite and actinomorphic flowers. Gamosepalous glabrous calyx, 1-5 lobulated; straight tube; 1.5-2 mm rounded, rarely truncate lobules with a dark upper end. White hypocrater-morph corolla, with yellow spots in the throat opening, without appendixes; 15-25 mm curved conduit, usually 25-35 x 20-30 mm, thoroughly obovate to obovate-oblong. Five-stamen androecium; free anthers detached from the stigma, no lengthening of the connective. Two-carpel apocarpic gynoecium; semi-inferous ovary, with abundant ova, and no nectaries; unique style; fusiform stigma underneath, and bi-apiculated on the top. Two-follicle, slightly compressed apocarpic fruit. Numerous dry seeds with concentric wings. It normally blossoms throughout the year. (Fig. 1.)

ISSN 1025-0247

Available: http://www.agrisost.reduc.edu.cu

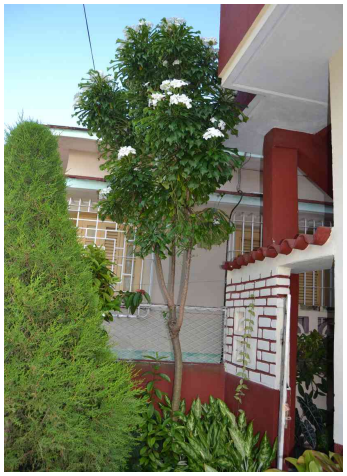

Fig1a. View of the plant in urban home garden.

Fig1b. Characteristics of the plant: (A) plant and flowers, (B) leaves, (C) detail of reverse, (D) flower, (E) calyx.

It is originally from South and Central America, and it has been cultivated in different parts of the world. Seemingly, its introduction in Cuba was made recently, but it has widespread very quickly to all provinces.

This species is not registered in the works of Pichardo (1862); Sauvalle (1873); Gómez de la Maza (1889 and 1897); Gómez de la Maza & Roig (1914); Calvino (1923); Agete (1939); Alain (1957); Anonymous (1958); Roig (1965); Alain (1969); Borhidi, 1981 [“1980”]; Boldo & Estévez (1990); Arias, Díaz, Leiva & Rodríguez (1992); Esquivel, Knüpffer & Hammer (1992); Fuentes *et al*. (2001); Alfonso & Bécquer (2016); Greuter & Rankin (2016), and Machado, Carracedo & Acosta (2016). Evidence of previous collection in Cuba was not either in the Cuban Data Network of Biodiversity, or in several herbaries (HAC, HAJB, HIPC and ULV).

Authors like Alfonso & Bécquer (2016), and Machado, Carracedo & Acosta (2016), referred to the existence of this species in Havana and Santiago de Cuba, respectively, but disregarded the discovery. Likely, these authors based their observations directly on the field, but did not collect any type of evidence. This article confirms the presence of *Plumeria pudica* in Cuban vegetation.

Specimens observed: Camaguey city, la Caridad area, home gardens. J Rifa, 12031, 4-IV-2017 (HIPC). Holguín, Carretera a Gibara Km 2, home gardens. I. E. Méndez, 12032, 30-IV-2017 (HIPC).

The plant is used for ornamental purposes in Cuba. It is thought to have toxic properties, due to the presence of alkaloids, agoniadine, plumerine, and plumeritanic acid (Sena, Duarte da Rocha, Oliveira, Ramos & Ramos, 2016). It is also used to treat digestive disorders and infections, for its ani-inflammatory, antipiretic, and antioxidant properties, thanks to tannin, alkaloid, flavonoid, iridoide, histamine, and serotonnin contents (Chanaka, Manuja, Roja, Jyothi, Swetha & Guru,

ISSN 1025-0247

Available: http://www.agrisost.reduc.edu.cu

2016; Fernandes *et al*., 2015). Genus *plumeria* has antioxidant, antimicrobial, and analgesic actions (Ramproshad, Afroz, Mondal, Khan & Ahmed, 2012); its larvicide properties are highly toxic to two species of mosquitoes: *Aedes aegyti* and *A. stephensi* (Chandrashekhar, Patil, Borase, Slunke & Salunke, 2012), two important aspects to study further in P. pudica.

Alfonso & Bécquer (2016) considered it potentially dangerous (grade III) to children in day care centers, since the contact with latex can cause skin irritation.

The introduction of *P. pudica* is the fourth species of genus *Plumeria* found in Cuba, which may be differentiated by the dichotomous key below,

1 Linear to filiform leaves of up to 1 cm wide..... *P. filifolia*
- Oblong to elliptic, to elliptic-oblanceolate, obovate or linear lyra-shaped lanceolate leaves ……..... 2

2 Subsessile leaves (petioles smaller than 1 cm); frequently pandurated lyrate sheets (especially at a young age)..…… *P. púdica*
- Clearly petiolate leaves (1 cm or more petioles); oblong to elliptic to elliptic-oblanceolate, obovate or linear-lanceolate sheets (never lyrate or pandurated)..... 3

3 Generally acute or acuminate leaves in the apex; 8-18 cm follicles; 2.6-3.2 cm seeds……..…..……..….. *P. obtuse*
- Slightly obtuse to round leaves; 19-38 cm follicles; 5.5-8 cm seeds..... *P. rubra*

ACKNOWLEDGMENTS

The authors wish to thank the collaboration of Orlando Abreu Girardo, who assisted us with providing the data that made this study possible.

REFERENCES

Agete, F. (1939). Floricultura cubana. *Revista de Agricultura* (La Habana) 5 (1) 1582 - 1603.

Alain, H. (1957). *Flora de Cuba, 4. Dicotiledóneas: Melastomataceae a Plantaginaceae*. Contribuciones Ocasionales del Museo de Historia Natural del Colegio de La Salle 16. La Habana.

Alain, H. (1969). *Flora de Cuba. Suplemento*. Caracas.

Alfonso, P. & E. Bécquer (2016). Plantas potencialmente peligrosas para la salud, presentes en instituciones infantiles del Cotorro, La Habana, Cuba. *Revista del Jardín Botánico Nacional*, 37 (s.n.): 67-80.

Allorge, L. (s.f.). *Flora of the Guianas. 140.* Apocynaceae. Accedido en Internet en junio de 2017. www.ilerouge.org/documents/Flore%20des%20trois%20Guyanes.pdf

Anonymous (1958). *Flowering plants from Cuban Gardens*. Seoane, Fernández y Cía. La Habana.

Arias, I. Díaz, M. Leiva, A. & A. Rodríguez (1992). Preliminary Notes on Some Ornamental Plants. In: "... y tienen faxones y fabas muy diversos de los nuestros...". Origin, Evolution and Diversity of Cuban Plant Genetic Resources. K. Hammer, M. Esquivel & H. Knüpffer (eds.). Vol. 3. 3. Chapter 27: 655 - 662. Institut für Pflanzengenetik und Kulturpflanzeforschung Gatersleben, Germany.

ISSN 1025-0247

Available: http://www.agrisost.reduc.edu.cu

Boldo, B. & J. Estévez (1990). Descriptiones diversorum generum specierumque insulae Cubae plantarum quas Regia Guantanamensis Legatio inspexit in: J FERNÁNDEZ CASAS, M. PUIG-SAMPER & F. SÁNCHEZ GARCÍA (eds.): Cubensis prima flora. *Fontqueria* 29: 19-176.

Borhidi, A. 1981 ["1980"]. New names and new species in the flora of Cuba, II. Acta Bot. Acad. Sci. Hung. 26: 255-275.

Calvino, M. (1923). Rosas y flores en Cuba. *Revista de Agricultura, Comercio y Trabajo* 5 (10-11): 40-44.

Chanaka, W., M. Manuja, P. Roja, R. Jyothi, B. Swetha & P. Guru (2016). Extraction of acetylcholine esterase inhibitors from *Plumeria pudica* and analyzing its activity on zebrafish brain. *World Journal of Pharmacy and Pharmaceutical Sciences*, 5 (4): 1781-1791. DOI: 10.20959/wjpps20164-6489

Chandrashekhar, P., A. Patil, A. Borase, B. Slunke & R. Salunke (2012). Larvicidal activity of silver monoparticles synthesized using *Plumeria rubra* plant latex against *Aedes aegypti* and *Anopheles stepheni*. *Parasitol Ress*, 110: 1815-1822.

Chong, K., H. Tan & R. Corlett (2009). *A Checklist of the Total Vascular Plant Flora of Singapore: Native, Naturalised and Cultivated Species***.** Raffles Museum of Biodiversity Research National University of Singapore Singapore.

Esquivel, M. A., H. Knüpffer & K. Hammer (1992). Inventory of the Cultivated Plants. In: "... y tienen faxones y fabas muy diversos de los nuestros...". Origin, Evolution and Diversity of Cuban Plant Genetic Resources. K. Hammer, M. Esquivel & H. Knüpffer (eds.). Vol. 2. Chapter 14: 213 - 454. Institut für Pflanzengenetik und Kulturpflanzeforschung Gatersleben, Germany.

Fernandes, H., D. Machado, J. Días, T. Brito, J. Batista, R. Silva, et al. (2015). Laticifer proteins from Plumeria pudica inhibit the inflammatory and nociceptive responses by decreasing the action of inflammatory mediators and pro-inflammatory cytokines. Revista Brasileira de Farmacognosia, 25 (3):269-277.

Font Quer, P. (1975). *Diccionario de Botánica*. (5ta. ed.). Madrid: Editorial Labor, S. A.

Fuentes, V., T. Shagarodsky, P. Sánchez, L. Castiñeiras, Z. Fundora, O. Barrios, et al. (2001). Plantas ornamentales en conucos de Cuba Central y Oriental. *Revista del Jardín Botánico Nacional* (Universidad de La Habana) 22 (1) 119 - 131.

Gómez De La Maza, M. & J. Roig (1914). *Flora de Cuba (datos para su estudio)*. Boletín de la Estación Experimental Agronómica de Santiago de las Vegas no. 22.

Gómez De La Maza, M. (1889). Diccionario botánico de los nombres vulgares cubanos y puertorriqueños. La Habana.

Gómez De La Maza, M. (1897). Flora H**a**banera. Fanerógamas. Habana.

Greuter, W. & R. Rankin (2016). *Espermatófitos de Cuba Inventario preliminar. Parte II: Inventario*. Botanischer Garten und Botanisches Museum Berlin-Dahlem. Zentraleinrichtung der Freien Universität Berlin. Königin-Luise-Str. 6-8, D-14195 Berlin, Germany. doi: http://dx.doi.org/10.3372/cubalist.2016.2

Harvard University. (s.f.). Harvard University Herbaria & Libraries. Retrieved on August 20, 2017, from https://huh.harvard.edu/

ISSN 1025-0247

Available: http://www.agrisost.reduc.edu.cu

Instituto de Ecología y Sistemática. (s.f.). Red de Información de la Biodiversidad. Retrieved on October 30, 2017, from http://www.ecosis.cu/biocuba/biocuba.htm

JSTOR, digital library for scholars, researchers and students. (s.f.). Jstor Global Plants. Retrieved on August 20, 2017, from http://plants.jstor.org/

Lippold, H. (1979). Die Gattung *Plumeria* L. *(Apocynaceae)* auf Cuba. *Feddes Repert*, 90: 193-215.

Machado, G., C. Carracedo & F. Acosta (2016). Composición del arbolado en áreas de interés histórico y monumental de la ciudad de Santiago de Cuba. *Ciencia en su PC*, (3) julio-septiembre: 94-103.

Missouri Botanical Garden. (s.f.). Tropicos database. Retrieved on August 20, 2017, from http://www.tropicos.org/

Morales, J. (2006). Estudios en las Apocynaceae neotropicales XXVIII: la familia Apocynaceae (Apocynoideae, Rauvolfioideae) de El Salvador, Centroamérica. *DARWINIANA*, 44(2): 453-489.

National Museum of Natural History, Smithsonian Institution. (s.f.). Virtual Herbarium. Retrieved on August 20, 2017, from http://botany.si.edu/

Pichardo, E. (1862). Diccionario provincial casi razonado de voces cubanas. Ed. 3. 3. La Habana.

Radha, R., S. Kavimani & V. Ravichandran (2008). Anti-tumour Activity of Methanolic Extraction of *Plumeria alba L.* leaves against Dalton Lymphoma Ascites in Mice. *International Journal of Health Research*, 1 (2): 79-85.

Ramproshad, S., T. Afroz, B. Mondal, R. Khan & S. Ahmed (2012). Screening of phytochemical and pharmacological activities of leaves of medicinal plant *Plumeria rubra*. *International Journal of Research in Pharmacy and Chemistry*, 2(4):1001-1007.

Rodríguez, G., K. Banda, S. Reyes & A. Estupiñán (2012). Lista comentada de las plantas vasculares de bosques secos prioritarios para la conservación en los departamentos de Atlántico y Bolívar (Caribe colombiano). *Biota Colombiana*, 13 (2): 7-39.

Rodríguez, G., K. Banda, S. Reyes & A. Estupiñán (2012). Lista comentada de las plantas vasculares de bosques secos prioritarios para la conservación en los departamentos de Atlántico y Bolívar (Caribe colombiano). *Biota Colombiana*, 13 (2): 7-39.

Roig, J. (1965). *Diccionario botánico de nombres vulgares cubanos*. 2 vol. Editora del Consejo Nacional de Universidades. La Habana.

Royal Botanic Gardens. (s.f.). Kew, Royal Botanic Gardens. Retrieved on August 20, 2017, from https://www.kew.org/science/collections

Sanabria, M., R. Infante, R. Valera, N. Maciel & A. Mendoza (2014). Metabolitos secundarios en siete biotipos de *Plumeria* en el estado lara, Venezuela. *Rev. Fac. Agron. (LUZ)*, 1: 423-434.

Sauvalle, F. A. (1873). *Flora cubana. Enumeratio nova plantarum cubensium vel revisio catalogi Grisebachiani*. La Habana.

Sena, S., C. Duarte Da Rocha, D. Oliveira Santana, L. Ramos & A. Ramos (2016). Plantas tóxicas: análise *in loco* da existência no bairro areal em Porto Velho - ro. *Saber Científico*, V: 1-13.

Stang, D. (s.f.). Imagen de Plumeria pudica Jacq. Retrieved on August 20, 2017, from http://www.tropicos.org/Image/

ISSN 1025-0247

Available: http://www.agrisost.reduc.edu.cu

The New York Botanical Garden. (s.f.). Virtual Herbarium. Retrieved on August 20, 2017, from http://www.nybg.org/

Thiers, B. [permanentemente actualizado]. Index Herbariorum: A global directory of public herbaria and associated staff. New York Botanical Garden's Virtual Herbarium. Available at <http://sweetgum.nybg.org/ih>. Accessed on July 17, 2017.

Woodson, R., R. Schery & J. Nowicke (1970). Flora of Panama. Part VIII. Family 162. Apocynaceae. *Annals of the Missouri Botanical Garden*, 57 (1): 59-130.

Zarucchi, J. 1987 [1988]. Series of revisions of Apocynaceae, pt. 24. A revision of the tribe Ambelanieae (Apocynaceae-Plumerioideae). Agric. Univ. Wageningen Pap. 87(1): 1–106.